11/20/17 "The things which hurt, instruct" -Benjamin Franklin

HW: "The Discriminant" w/s #3, 7, 10, 12, 13, 15
Test 1 on Wednesday 11/29

AIM: What is the Discriminant?

Warm Up:

On the worksheet

1. $y = x^2 - 6x + 9$

$a = 1$
$b = -6$
$c = 9$

$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(9)}}{2(1)} = \frac{6 \pm \sqrt{0}}{2} = \frac{6 \pm 0}{2}$

$\frac{6+0}{2} = 3 \quad \frac{6-0}{2} = 3$

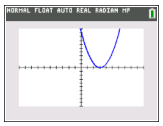
c) choice c

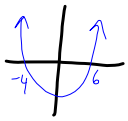
2. $y = x^2 - 2x - 24$

$a = 1$
$b = -2$
$c = -24$

$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-24)}}{2(1)}$

$x = \frac{2 \pm \sqrt{100}}{2} \Rightarrow \frac{2 \pm 10}{2}$

b) 

b) 

$\frac{2+10}{2} = 6 \quad \frac{2-10}{2} = -4$

3. $y = x^2 + 4x + 1$

$a = 1$
$b = 4$
$c = 1$

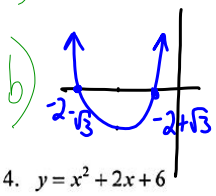
$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(1)}}{2(1)} = \frac{-4 \pm \sqrt{12}}{2} = \frac{-4 \pm \sqrt{4}\sqrt{3}}{2}$

$= \frac{-4 \pm 2\sqrt{3}}{2}$

$= \frac{-2 \pm 1\sqrt{3}}{1} = -2 \pm \sqrt{3}$

c) choice a

c) d. real, irrational, unequal

b) 

4. $y = x^2 + 2x + 6$

$a = 1$
$b = 2$
$c = 6$

$x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(6)}}{2(1)}$

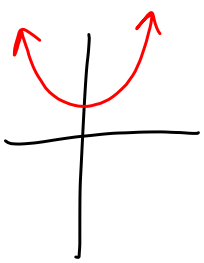
$x = \frac{-2 \pm \sqrt{-20}}{2} = \frac{-2 \pm i\sqrt{20}}{2}$

$= \frac{-2 \pm i\sqrt{4}\sqrt{5}}{2}$

$= \frac{-2 \pm 2i\sqrt{5}}{2}$

$= \frac{-1 \pm 1i\sqrt{5}}{1} = -1 \pm i\sqrt{5}$

c) b. imaginary

b) 

$b^2 - 4ac$ is called the discriminant, d, of the equation. You can determine the nature of the roots from the discriminant.

Value of discriminant	Description of roots	Description of graph (include number of x intercepts)
$d = 0$	Real, Rational, Equal	1 x-int.
$d > 0$ and a perfect square	Real, Rational, Unequal	2 x-int.
$d > 0$ and not a perfect square	Real, Irrational, Unequal	2 x-int.
$d < 0$	Imaginary	0 x-int

When the discriminant > 0, the equation has 2 real solutions.

When the discriminant < 0, the equation has 0 real solutions.

When the discriminant = 0, the equation has 1 real solutions.

In 1-10, find the value of the discriminant and describe the nature of the roots.

1. $x^2 - 4x + 8 = 0$

2. $x^2 - 15x + 36 = 0$

4. $\frac{1}{4}x^2 - 6x + 36 = 0$

6. $x^2 + \sqrt{12}x + 3 = 0$

8. $\frac{3}{x} - 4 = x$

11. Which parabola touches the x- axis at one point?

(1) $y=x^2+8x+16$ (2) $y=x^2-5x+6$

(3) $y=x^2-16$ (4) $y=x^2+4$

14. Given the equation $ax^2+bx+c=0$. If $b^2<4ac$, then the roots of the equation must be

(1) real and irrational (2) real and rational
(3) equal (4) imaginary

16. Find the largest integral value of c for which the roots of $2x^2-8x+c=0$ are real.